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EXAMINER

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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte JOHANNES LEENDERT DEN BOESTERT and
JEROEN VAN WESTRENEN

Appeal 2009-002209
Application 10/825,484
Technology Center 1700

Decided: January 28, 2010

Before JEFFREY T. SMITH, LINDA M. GAUDETTE, and
JEFFREY B. ROBERTSON, *Administrative Patent Judges*.

GAUDETTE, *Administrative Patent Judge*.

DECISION ON APPEAL

Appellants appeal under 35 U.S.C. § 134(a) from the Examiner's
decision finally rejecting claim 1 (Final Office Action ("Final"), mailed Oct.

4, 2007, 1). (Appeal Brief (“Br.”), filed Apr. 14, 2008, 2.)¹ We have jurisdiction under 35 U.S.C. § 6(b).

We REVERSE.

The invention is directed to “[a] process for separating colour bodies and/or asphalthenic contaminants from a hydrocarbon mixture using a membrane having a feed side and a permeate side.” (Claims Appendix to Appeal Brief, claim 1.) The claimed method includes the steps of:

contacting the hydrocarbon mixture with the feed side of the membrane, wherein between the feed side and permeate side of the membrane a pressure difference is applied, thereby passing part of the hydrocarbon mixture from the feed side to the permeate side and

obtaining at the permeate side of the membrane a hydrocarbon permeate having a reduced content of colour bodies and/or asphalthenic contaminants, and by removing the hydrocarbon permeate from the permeate side of the membrane.

(*Id.*)

During membrane separation processes, deposits build up on the membrane surface over time, reducing the flux of permeate. (*See generally*, Spec. 1:23-28; Moller (WO 01/10540 A2, published Feb. 15, 2001) 1:20-21.) A known prior art technique for returning the process to a higher average flux is to temporarily reverse the direction

¹ “Claim 2” is pending and finally rejected under 35 U.S.C. § 102(b) (Final 1; Examiner’s Answer (“Ans.”), mailed May 29, 2008, 2) but “[is] not being appealed.” (Br. 2; *see also*, Ans. 3.) The Examiner has withdrawn the final rejection of claims 1-16 under 35 U.S.C. § 103(a). (Ans. 3.) Therefore, claims 3-16, also pending, are now indicated as allowable, but remain objected to as dependent on a rejected base claim. (Ans. 2.)

of fluid flow through the membrane, i.e., permeate is flushed back through the membrane to the feed side. (Spec. 4:5-7; Moller 1:23-25.)

According to Appellants, this type of procedure, known as backwashing, is complex to control and can damage the membrane. (Spec. 4:7-16.)

Appellants are said to have discovered a method by which accumulated deposits can be loosened and removed from a membrane, thereby improving flux without the need for backwashing. (Spec. 4:1-4; *see also*, 9:1-16.) According to the method, permeate removal is periodically stopped during the separation process. (Spec. 2:27-28.) During this time, the pressure at the feed side is not released (Spec. 5:1-4) and part of the feed continues to permeate through the membrane, resulting in an increase in the pressure at the permeate side (Spec. 2:31-34.) The pressure at the permeate side approaches the higher pressure at the feed side, until the pressures at both sides have gradually equilibrated. (Spec. 2:34-3:2.) The pressure on the permeate side may equal, but does not exceed the pressure on the feed side. (*See* Spec. 3:15-36; claim 1, second “wherein” clause, *infra* pp. 3-4.) After the flux of permeate reaches a certain minimally acceptable value, permeate removal is resumed and membrane separation returns to the original maximum flux. (Spec. 3:4-10.)

The above-described inventive features are expressed in the following two “wherein” clauses of claim 1 (hereinafter referred to as “last two,” or “first” and “second” “wherein” clauses):

wherein during selected time intervals the removal of hydrocarbon permeate from the permeate side of the membrane is stopped so that the pressure difference over the membrane is temporarily substantially lowered,

wherein during the process, a feed pressure level at the feed side is maintained at least as large as a permeate pressure level at the permeate side, so that the pressure difference is maintained at zero or greater.

(Claims Appendix to Appeal Brief, claim 1.)

The Examiner rejected claim 1 under 35 U.S.C. § 102(b) as anticipated by Moller. (Ans. 3-5.) Appellants request reversal of this rejection, presenting the following issue for our review (*see* Br. 3): have Appellants shown reversible error in the Examiner's finding that Moller teaches a process in which "feed pressure level at the feed side is maintained at least as large as a permeate pressure level at the permeate side, so that the pressure difference is maintained at zero or greater" as required by the second "wherein" clause of claim 1? We answer this question in the affirmative for the reasons explained below.

Appellants concede that Moller discloses "a filtration system with a permeable membrane, which filters a fluid by applying a forward pressure differential from the retentate to the permeate for driving fluid through the membrane in a filtering direction." (Br. 3.) However, Appellants argue that the disclosure in Moller relied upon by the Examiner to show the limitations of the last two "wherein" clauses relates to a backwashing procedure in which a backwards pressure differential from the permeate to the retentate is applied. (*Id.* (citing Moller 6:9-14).) In other words, Appellants contend that during Moller's backwashing procedure, retentate (feed) pressure is not maintained at a level equal to or greater than permeate pressure level at the permeate side as required by the second "wherein" clause of claim 1. (*See* Br. 3.)

Moller describes

first pressure generating means for generating a first pressure differential between the retentate side and the permeate side for driving the fluid through the membrane in a filtering direction and causing the fluid to flow along the surface of the membrane facing the retentate during a filtering phase, [and] second pressure generating means for periodically generating a second pressure differential between the permeate side and the retentate side during a period of time for driving the fluid back through the membrane in a backwashing direction during a backwashing phase.

(Moller 8:31-9:5.)

Appellants are correct in stating that the disclosures in Moller relied upon by the Examiner for a teaching of the last two wherein clauses (*see* Ans. 5-7 (citations to Moller)) pertain to Moller's backwashing procedure and the second pressure differential, i.e., a measure of pressure generated from the permeate side to the retentate side. (*See* Moller 4:26-5:3; 6:9-14; 8:15-21.)

On page 8, lines 15-18, relied upon by the Examiner for an explicit teaching of the second "wherein" clause limitation (Ans. 6-7), Moller describes maintaining a positive second pressure differential. (Moller 8:15-21 ("[S]aid second pressure differential between the permeate and the retentate . . . is maintained positive "[T]he backwashing transmembrane pressure entails a transport of permeate in the backwashing direction.")) In other words, Moller actually describes maintaining the permeate pressure at a higher level than the retentate (feed) pressure level, which is the exact opposite of the process condition imposed by the second wherein clause of appealed claim 1. (*Contra* Ans. 6-7 (misquoting Moller 8:15-18).)

In view of the foregoing, we are in agreement with Appellants that the Examiner's rejection of claim 1 is based on an erroneous finding that Moller discloses a process which includes the limitation recited in the second "wherein" clause of claim 1. Because Appellants have identified reversible error in the Examiner's finding of anticipation, we do not sustain rejected claim 1 under 35 U.S.C. § 102(b) as anticipated by Moller.

REVERSED

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